

Notice of Allowability

Application No.

10/644,327

Examiner

Victor J. Taylor

Applicant(s)

GAO, LI

Art Unit

2863



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 6 July 2004.
2. ☒ The allowed claim(s) is/are 12-41.
3. ☒ The drawings filed on 24 February 2004 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 8
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____.
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

DETAILED ACTION

Drawings

1. The drawings were received on 2/24/2004. These drawings are approved.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 20 August 2003 was entered after the mailing date of the office action on 17 June 2004 and consequently was not before the examiner during the previous examination. The submission of this IDS is in compliance with the provisions of 37 CFR 1.97 and was timely. Accordingly, the examiner is considering the information disclosure statement during this office action. The examiner wishes to thank the attorney for submitting the additional copies of the missing previous submitted publications as cited in this document.

Response to Arguments

3. Applicant's arguments, citing the missing documents associated with the instant application including the IDS and the original preliminary amendment as filed 20 August 2003 with respect to the response of 7 July 2004 with the duplicate preliminary amendment and entered on 7 July 2004 have been fully considered and are persuasive. This preliminary amendment was not entered in the instant application when the application was before the examiner. The rejection of 17 June 2004 has been withdrawn. The examiner wishes to thank the attorney for clearly pointing this out in the response to the office action.

Art Unit: 2863

4. Applicant's arguments see the response to the office action of 17 June 2004 and filed 06 July 2004, with respect to the new claims 12- 41 and the cancelled claims of 1- 11 have been fully considered and are persuasive. The statutory double patenting under 35 U. S. C 101 on 17 June 2004 is Moot and has been withdrawn.

Prior Art

5. The prior art made of record and not relied upon is considered pertinent to applicant;

I. Art A Kriegshauser et al., US 6,466,872 in class 702/007 is cited for the method of determination of apparent resistivity of anisotropic reservoirs using steps to apply shoulder corrections to measurements from a multi-component electromagnetic logging tool with computer processing for the anisotropic resistivity model using corrected data with process iterated until a good match is obtained between the corrected data and the model output using the logging tool in figure 2 the process steps in figure 4 to obtain shoulder bed corrections in lines 5-65 of column 3 and column 4.

II. Art B of Chunduru et al., US 6,344,746 in class 324/339 is cited for the method and computer modeling of time lapse measurements of resistivity data acquired at different epochs using different types of wellbore tools to process raw induction logging data with steps of processing earth models using the inversion process to determine bed boundaries and layers using the processes steps in figure 3 to determine the model parameters in line 7 of column 6 and teaches solving the minimization process using linear equations and teaches steps using the Jacobian matrix to correspond to measurements made at the first epoch in the upper portion and with the lower portion of

Art Unit: 2863

the Jacobian matrix corresponding to measurements made at the second epoch in the computation of there model in lines 50 and 5-65 of column 6.

Allowable Subject Matter

6. Claims 12-41 are allowed.

7. The following is an examiner's statement of reasons for allowance:

The amendments of record presented with the arguments of record on 17 June 2004 by the applicant in the instant application convinces the examiner that the application is allowable over the cited art of record.

I. The system in claim 12 for determining a formation profile surrounding a wellbore with computer steps operable for "receiving field log data for a formation surrounding a wellbore" ...[and] with the steps of "generating a Jacobian matrix responsive to the field log data" " ...[and] with the steps of "the computer operable to solve for a new formation conductivity profile using the Jacobian matrix" ...[and] with the steps to "calculate a new log response using the formation conductivity profile" ...[and] with the steps to "determine the log response converges with the received field log data" ...[and] with the steps of "performing a quasi-Newton update of the Jacobian matrix and repeating the steps of operation for steps c to e if the log response does not converge with the received field log data... and/or in combination with "outputting the formation profile based upon the log response if the log response converges with the received field log data" is not found in the cited art of record.

The prior Art A of Kriegshauser et al., US 6,466,872 teaches the method of determination of the apparent resistivity of anisotropic reservoirs using steps to apply

Art Unit: 2863

shoulder corrections to the measurements from a multi-component electromagnetic logging tool, and teaches using computer processing for the anisotropic resistivity model and teaches using the corrected data with process steps in the model iterated until a good match is obtained between the corrected data and the model output and teaches using the logging tool in figure 2 with the process steps in figure 4 to obtain the shoulder bed corrections in lines 5-65 of column 3 and column 4.

The prior Art B of Chunduru et al., teaches computer modeling of the time lapse measurements of the resistivity data acquired at different epochs and teaches using different types of wellbore tools to process the raw induction logging data teaches steps for processing the earth models and teaches steps for using the inversion process to determine the bed boundaries and layers by using the processes steps in figure 3 and teaches step of computer instruction used to determine the model parameters in line 7 of column 6 and further teaches steps used for solving the minimization process with steps of using the linear equations. He further teaches steps of using the Jacobian matrix processed to correspond to the measurements made at the first epoch in the upper portion and with the lower portion of the Jacobian matrix corresponding to the measurements made at the second epoch in the computation of there model in lines 50 and 5-65 of column 6.

Therefore, the prior art Kriegshauser et al., and The prior art of Chunduru et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 13-17 which are dependent on the allowed independent claim 12 are allowed at least for the reasons cited above.

II. The system in claim 18 for determining a formation profile surrounding a wellbore The machine readable medium article of manufacture in claim 18 with the storage medium storing instructions operable to cause one or more machines to perform processing operations with computer steps operable for "receiving field log data for a formation surrounding a wellbore"...[and] with the steps of "generating a Jacobian matrix responsive to the field log data" "...[and] with the steps of the computer operable for "solving for a new formation conductivity profile using the Jacobian matrix"...[and] with the steps to "calculate a new log response using the formation conductivity profile"...[and] with the steps to "determine the log response converges with the received field log data"...[and] with the steps of "performing a quasi-Newton update of the Jacobian matrix and repeating the steps of operation for steps c to e if the log response does not converge with the received field log data...and/or in combination with "outputting the formation profile based upon the log response if the log response converges with the received field log data" is not found in the cited art of record.

The prior Art A of Kriegshauser et al., US 6,466,872 teaches the method of determination of the apparent resistivity of anisotropic reservoirs using steps to apply shoulder corrections to the measurements from a multi-component electromagnetic logging tool, and teaches using computer processing for the anisotropic resistivity model

Art Unit: 2863

and teaches using the corrected data with process steps in the model iterated until a good match is obtained between the corrected data and the model output and teaches using the logging tool in figure 2 with the process steps in figure 4 to obtain the shoulder bed corrections in lines 5-65 of column 3 and column 4.

The prior Art B of Chunduru et al., teaches computer modeling of the time lapse measurements of the resistivity data acquired at different epochs and teaches using different types of wellbore tools to process the raw induction logging data teaches steps for processing the earth models and teaches steps for using the inversion process to determine the bed boundaries and layers by using the processes steps in figure 3 and teaches step of computer instruction used to determine the model parameters in line 7 of column 6 and further teaches steps used for solving the minimization process with steps of using the linear equations. He further teaches steps of using the Jacobian matrix processed to correspond to the measurements made at the first epoch in the upper portion and with the lower portion of the Jacobian matrix corresponding to the measurements made at the second epoch in the computation of there model in lines 50 and 5-65 of column 6.

Therefore, the prior art Kriegshauser et al., and The prior art of Chunduru et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 19-23 which are dependent on the allowed independent claim 18 are allowed at least for the reasons cited above.

III. The method in claim 24 for determining a formation profile surrounding a wellbore with method steps for “receiving field log data for a formation surrounding a wellbore” ”...[and] with the steps of “determining a uniform initial conductivity vector based on the average of the logging data apparent conductivity”...and/or in combination with the method steps for “generating a Jacobian matrix using a sliding window and the conductivity vector” is not found in the cited art of record.

The prior Art A of Kriegshauser et al., US 6,466,872 teaches the method of determination of the apparent resistivity of anisotropic reservoirs using steps to apply shoulder corrections to the measurements from a multi-component electromagnetic logging tool, and teaches using computer processing for the anisotropic resistivity model and teaches using the corrected data with process steps in the model iterated until a good match is obtained between the corrected data and the model output and teaches using the logging tool in figure 2 with the process steps in figure 4 to obtain the shoulder bed corrections in lines 5-65 of column 3 and column 4.

The prior Art B of Chunduru et al., teaches computer modeling of the time lapse measurements of the resistivity data acquired at different epochs and teaches using different types of wellbore tools to process the raw induction logging data teaches steps for processing the earth models and teaches steps for using the inversion process to determine the bed boundaries and layers by using the processes steps in figure 3 and teaches step of computer instruction used to determine the model parameters in line 7

Art Unit: 2863

of column 6 and further teaches steps used for solving the minimization process with steps of using the linear equations. He further teaches steps of using the Jacobian matrix processed to correspond to the measurements made at the first epoch in the upper portion and with the lower portion of the Jacobian matrix corresponding to the measurements made at the second epoch in the computation of there model in lines 50 and 5-65 of column 6.

Therefore, the prior art Kriegshauser et al., and The prior art of Chunduru et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 25-29 which are dependent on the allowed independent claim 24 are allowed at least for the reasons cited above.

IV. The system in claim 30 for determining a formation profile surrounding a wellbore with the computer operable with steps for "receiving field log data for a formation surrounding a wellbore" "...[and] with the steps of "determining a uniform initial conductivity vector based on the average of the logging data apparent conductivity"...and/or in combination with the method the steps for "generating a Jacobian matrix using a sliding window and the conductivity vector" is not found in the cited art of record.

The prior Art A of Kriegshauser et al., US 6,466,872 teaches the method of determination of the apparent resistivity of anisotropic reservoirs using steps to apply

Art Unit: 2863

shoulder corrections to the measurements from a multi-component electromagnetic logging tool, and teaches using computer processing for the anisotropic resistivity model and teaches using the corrected data with process steps in the model iterated until a good match is obtained between the corrected data and the model output and teaches using the logging tool in figure 2 with the process steps in figure 4 to obtain the shoulder bed corrections in lines 5-65 of column 3 and column 4.

The prior Art B of Chunduru et al., teaches computer modeling of the time lapse measurements of the resistivity data acquired at different epochs and teaches using different types of wellbore tools to process the raw induction logging data teaches steps for processing the earth models and teaches steps for using the inversion process to determine the bed boundaries and layers by using the processes steps in figure 3 and teaches step of computer instruction used to determine the model parameters in line 7 of column 6 and further teaches steps used for solving the minimization process with steps of using the linear equations. He further teaches steps of using the Jacobian matrix processed to correspond to the measurements made at the first epoch in the upper portion and with the lower portion of the Jacobian matrix corresponding to the measurements made at the second epoch in the computation of there model in lines 50 and 5-65 of column 6.

Therefore, the prior art Kriegshauser et al., and The prior art of Chunduru et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 31-35 which are dependent on the allowed independent claim 30 are allowed at least for the reasons cited above.

V. The system in claim 36 for the machine readable medium article of manufacture with the storage medium storing instructions operable to cause one or more machines to perform processing operations for determining a formation profile surrounding a wellbore with the steps for "receiving field log data for a formation surrounding a wellbore" "...[and] with the steps of "determining a uniform initial conductivity vector based on the average of the logging data apparent conductivity"...and/or in combination with the method steps for "generating a Jacobian matrix using a sliding window and the conductivity vector" is not found in the cited art of record. The prior Art A of Kriegshauser et al., US 6,466,872 teaches the method of determination of the apparent resistivity of anisotropic reservoirs using steps to apply shoulder corrections to the measurements from a multi-component electromagnetic logging tool, and teaches using computer processing for the anisotropic resistivity model and teaches using the corrected data with process steps in the model iterated until a good match is obtained between the corrected data and the model output and teaches using the logging tool in figure 2 with the process steps in figure 4 to obtain the shoulder bed corrections in lines 5-65 of column 3 and column 4.

The prior Art B of Chunduru et al., teaches computer modeling of the time lapse measurements of the resistivity data acquired at different epochs and teaches using

Art Unit: 2863

different types of wellbore tools to process the raw induction logging data teaches steps for processing the earth models and teaches steps for using the inversion process to determine the bed boundaries and layers by using the processes steps in figure 3 and teaches step of computer instruction used to determine the model parameters in line 7 of column 6 and further teaches steps used for solving the minimization process with steps of using the linear equations. He further teaches steps of using the Jacobian matrix processed to correspond to the measurements made at the first epoch in the upper portion and with the lower portion of the Jacobian matrix corresponding to the measurements made at the second epoch in the computation of there model in lines 50 and 5-65 of column 6.

Therefore, the prior art Kriegshauser et al., and The prior art of Chunduru et al., in combination or alone does not teach the present limitation of the claimed combination limitation.

It is these limitations expressed in each of these claims and not found, taught, or suggested in the prior art of record, that makes these claims allowable over the prior art.

Claims 37-41 which are dependent on the allowed independent claim 36 are allowed at least for the reasons cited above.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Victor J. Taylor whose telephone number is 571-272-2281. The examiner can normally be reached on 8:00 to 5:30 PM.


Art Unit: 2863

9. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John E. Barlow can be reached on 571-272-2863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

10. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

VJT


September 3, 2004.


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